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Science News-Letter

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ANTHROPOLOGY

Low-Browed Cave-Men Called Grandparents

By Frank Thone

It may be, after all, that Neanderthal Man was our ancestor, and not merely a remote uncle who died long ago, leaving no descendants. It is quite possible that this ancient and primitive race, whose low-browed, heavy-jawed skulls have been found in many places in Europe, and lately also in Palestine, had a part in the evolution of the human race as we know it today.

So says Dr. Ales Hrdlicka, eminent anthropologist of the U. S. National Museum.

In a noteworthy address delivered a short time ago in London, where he received the Huxley Medal, the highest honor that his English fellow-scientists have in their gift, this noted American student of the Science of Man challenged the widely accepted view that the Neanderthal type was merely a side branch of the human race, which had its day of dominance in Europe but was suddenly and completely wiped out by newcomers of an entirely distinct human species with a totally different culture. In a painstaking survey of all the evidence so far in hand, he has been unable to find anything like clear proof that this race vanished as abruptly as is commonly assumed; and there are growing indications of transition between the culture of the last Neanderthalers and the first men of the modern type, where the same cave was occupied for many generations and many layers of refuse, containing discarded weapons and utensils, were built up on the floor.

The Neanderthal race has been a subject of scientific dispute ever since the discovery of the first skeletal remains was announced. This was in 1857, and the find was made in the Neander Valley in Western Germany. The German word for "valley" is "thal"; Neanderthal man, therefore, is simply the Man of the Neander Valley. Like the ancestors of many a later man of prominence, he got his name from the place where he lived, though he wasn't christened until long after he was dead. As a rule, anthropologists name prehistoric races after the places where they first find their remains and the tools and utensils they once used.

WAS HE OUR ANCESTOR? Homo Neanderthalensis, the Neanderthal man, as restored from his skeletal remains. Dr. Hrdlicka says that he was one of our direct ancestors, not an uncle

When the first skeleton, with its astonishing skull and bones, was found in a cave in the right cliff of the Neander Valley, it caused a furore. Some authorities of the time, among them Rudolf Virchow, the great anatomist and pathologist, re-

(Just turn the page)

INDEX TO THIS ISSUE

Abbot, Chas. G. 27
Alcohol, Depressing 20
Alden, Raymond MacDonald 31
Ancestral Insect 31
Annual Reports for 1926 31
Aviators, Weather Service for 27

Besredka, A. 21
Boldyroff, W. N. 22
Brains, Mortality Price of 19

Cancer Diagnosis, New 20
Carlson, Anton J. 19
Carrel, Alexis 19
Chambers, Merritt M. 31
Chemical Patents Index 31
Chemical Society, The 31
Chemistry, Annual Survey of American 31
Chemistry, Story of 31
Cheney, Ralph H. 23
Coffee Called Beneficial 23
Corridors of Time—Vol. 4 31
Criminals, Desex 22

Darrow, Floyd L. 31
Davenport, Charles B. 20

East, E. M. 22
Emile Berliner 31
Essays, English and American 31
Eugenics Urged 20
Every Man a Brick 31

Fisher, Irving 19
Fleure, Herbert John 31
Friedlander, Immanuel 23

Germs, Nutrition of 29
Glover, James W. 19

Hickson, William J. 21
Hoffman, Frederick L. 21
Hrdlicka, Ales 17, 21
Human Race on Decline 19

Indians Absorbed 21
Insect, Ancestral 31

Jeans, J. H. 29

Landslide Coming, Greatest 23
Lifetime, Average 19

Miles, Walter R. 20
Monte Arbino Landslide 23
Morons, Disfranchise 21
Mortality Called Price of Brains 19

National Research Council 31
Nature Ramblings 31
Neanderthal Men Our Ancestors 17
Newburgh, Louis H. 19, 22
Nutrition of Germs 29

Obesity Not Glandular 19

Papanicolaou, George N. 20
Pasteur, Works of 29
Peake, Harold 31
Plotz, Harry 21
Priests and Kings 31
Proteins, Poisonous 22

Race Betterment Conference 19
Race Mixture, Dangers in 21
Rejuvenation, Little Hope for 22
Religion Needed, New 22
Ross, Edward A. 19
Russell, A. J. H. 21

Slade, William Adams 31
Smithsonian, New Head 27
Stardust 31
Stars May Be Liquid 29
Swiss Mountain Landslide 23

Traffic vs. Volcanoes 23
Unfit, Philanthropy Saves 19

Vaccination with Pills 21
Vaughan, Henry F. 22
Volcanoes vs. Traffic 23
Votes Denied to Morons 21

Warthin, Aldred Scott 22
Weather Service for Aviators 27
Wile, Frederic William 31
Worden, Edward Chauncey 31

Science News-Letter, Jan. 14, 1928

Neanderthaler Our Grandparent?

(*Continued from page* 17)

fused to believe that the skull was normal. It was a freak of nature, they said; or the individual to whom it had belonged had either been diseased or congenitally deformed. Only Thomas Henry Huxley, friend and champion of Darwin, stood out against this hue and cry, upholding the right of this extinct man to his proper place in the sun.

Later discoveries proved Huxley to be in the right. Other skulls were discovered, a score or more of them. They all had the same primitive structure, but in different degrees. They were all found in the same group of strata, associated with instruments of certain types and with the bones of extinct animals of the latter third of the glacial period. These freakish skulls were all of the same geological age, but their period was one of long duration. One skull might conceivably have been a freak, but when there were twenty, all more or less alike, backed up with evidence that they all lived in the same stretch of geological time, it was plain that they represented a fair set of samples of the population of Europe and the adjacent territories at that particular period. So the Neanderthal Race became an established unit in anthropological science.

Now the pendulum swung toward the other end of its arc. Instead of trying to deny the existence of this extinct race, it was set up by many as a distinct species, entirely separate from modern man. Neanderthal man got his name translated into Latin: *Homo neanderthalensis,* as distinguished from modern man, or *Homo sapiens.* (The *sapiens* tacked to our own name means "wise"; it is conjectured that Linnaeus wrote that down with his tongue in his cheek.) This separate Neanderthal species, men said, branched out from the main family tree, and when the first wave of modern men invaded Europe, presumably from Asia, to which, as the least known, all human origins are habitually referred, they simply wiped out the whole inferior species and supplanted it. This is the most widely held view even today of the history of Europe some 100,000-50,000 years ago. It was a Great Old War that lasted possibly for centuries, but ended in the total extinction of one of the combatant species.

This is the view that Dr. Hrdlicka seriously challenged in his Huxley Memorial Lecture, and he cited a dozen European authorities, beginning with Huxley, holding out against the majority opinion.

In setting forth his own views, Dr. Hrdlicka was careful to emphasize the present incompleteness of the records which do not justify very positive and dogmatic expression on the part of any one, whatever side of the debate he may support.

"The problem of Neanderthal man, as it now exists, presents the following uncertainties," said Dr. Hrdlicka. "It is not yet known just where and when and how he began, and how far eventually he extended geographically; it is not yet definitely known just who he was and what were his phylogenetic relations to the man that succeeded him; and it is not known plainly just why and how he ended, and whether or not he left any progeny. Besides which there are still but more or less vague notions regarding the exact length of his period, his average physique, his variations and subraces, the reasons for his relatively large brain, his changes in evolutionary direction. And there are other uncertainties. It thus appears that, notwithstanding his already numerous collected remains, the Neanderthal man is still far from being satisfactorily known to us taxonomically, chronologically and anthropologically.

"This state of uncertainties, and

(*Turn to page* 25)

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Mortality Called Price of Brains by Dr. Carrel

On this page Watson Davis reports some of the interesting subjects discussed at the Race Betterment Conference held at Battle Creek, Michigan, during the first week of January.

Although the human body in its elemental cells is potentially immortal, it will always be subject to senility and death as the price that it pays for having a brain. Dr. Alexis Carrel, of the Rockefeller Institute for Medical Research, New York, speaking before the Race Betterment Conference thus passed sentence upon the human hope of the eventual banishment of death.

Since Dr. Carrel has shown that human and other animal cells can be kept alive and made to grow indefinitely if they are removed from the body, tended and fed, this judgment is made on the highest authority. The same famous technique that he developed for cultivating in the test tube the chicken embryo heart tissue, that now after sixteen years would have reached a volume as large as the whole solar system if it could have grown unrestrictedly, has been applied to human flesh to show that it is capable of living forever.

Yet the cells will grow forever only if kept under more favorable conditions than the body affords. They must be fed what might be called the essence of youth, embryonic proteins and they must be removed from the restraint that the highly organized body and brain exercises.

"The only living forms enjoying eternal youth are the colonies of unicellular organisms which eliminate their metabolic products directly into the outside world," Dr. Carrel said. "When an animal is composed of a mass of cells organized as a closed system, the process of aging necessarily takes place. Immortality is incompatible with organization."

The price of brains, death, is not excessive, Dr. Carrel believes, because "the mysterious energy which is created by the cerebral cells, or expresses itself through them, is after all the greatest marvel of this universe."

There is hope that the duration of life may be artificially increased through the application of the results of experiments upon living cells and in nutrition, although Dr. Carrel's own findings can not yet be so applied.

Obesity Not Glandular

Fat people have nothing to blame but their own gluttony for obesity and by counting calories they can always reduce, Dr. Louis H. Newburgh of the University of Michigan declared in reporting experiments that refute the idea that obesity is due to internal gland trouble, heredity or any other trouble except eating too much. He blamed science, the source of America's greatly increased wealth of the last quarter century, for making America a race of overweight people who are being injured by their ability to buy rich and tempting foods. Consuming too much food is a personal fault like getting drunk in Dr. Newburgh's opinion and just as inexcusable.

Human Race on Decline?

Not all the scientists that attended the Conference were hopeful and enthusiastic about the future of the human race. We human beings have been patting ourselves on the back every time we hear the oft-repeated statement that the average span of human life has been increased some thirteen years since the turn of this century. Although this is true and health officials are to be congratulated, there are those who see civilization endangering the upward evolution of the race.

When Dr. Anton J. Carlson, chairman of the University of Chicago's department of physiology, looked at the life we lead today, he found the following dangerous symptoms:

Food is prepared artificially and under the influence of fads whereas men should become universally omniverous, eating all sorts of animals and plants, even snakes and grass if necessary. Our primitive ancestors probably developed some of their good qualities through enforced periods of quantitative undernutrition relieved by sprees of gorging.

Drugs and poisons, the only factors that have been found to really affect the germ plasm and thus influence the future of the race, are being forced upon the human race at a dangerous rate. Chemists are continually making new drugs and industrial poisons such as lead, now enter the daily life through motor fuels, sprayed fruits, and other substances.

Poisoned air and water endanger the city dweller and, although some animals, such as owls, live and thrive without seeing the sun, our indoor life, in Dr. Carlson's opinion, probably is a menace.

Sexually man is more out of adjustment than any other animal and his sex impulses are in excess of his needs for reproduction. This stimulation of sex is the basis of all progress in which man has seemed to exceed the apes, Dr. Carlson said, and it is related closely to memory, imagination and brain development.

Even the great progress that has been made toward the conquest of infective diseases, Dr. Carlson views as relatively unimportant in the future of the race because no past races of animals have been extinguished primarily by disease.

The race can be more easily injured than improved, Dr. Carlson indicated, and some phases of modern life give the opportunity for such injury.

Philanthropy Saves Unfit

By sheltering and caring for weaklings, the quality of the best peoples of the earth is being lowered, Prof. Edward A. Ross of the University of Wisconsin told the conference.

"Philanthropy is saving the unworthy from the results of their incompetency and misconduct," Dr. Ross said. "In all previous states of society fools and weaklings disappeared early, but now they are not only kept alive but are assisted to maintain homes in which they can raise children."

Laws against birth control information and social taboos were charged by Dr. Ross with allowing the dull, shiftless, improvident and brutal to continue to breed undesirable children at a high rate while the successful, educated and farsighted parents have limited their offspring to a reasonable number.

The average lifetime of those now born is about fifty-five years and Prof. Irving Fisher of Yale, who proved himself a good prophet by predicting twenty years ago an addition of fifteen years to average human life, said tonight: "By the year 1999 the average American should live to be an octogenarian."

But Dr. James W. Glover of the University of Michigan told the conference that before this ideal can be

(Just turn the page)

Race Betterment Conference

(*Continued from page* 19)

attained not only must there be no deaths at birth, in childhood, youth and middle age, but the rates of mortality at older ages must be reduced. No deaths before the age of fifty-two would increase the expectancy at birth to only seventy-two.

Depressing Alcohol

Experiments on rats and men which show that alcohol is a depressant rather than a stimulant and that it affects the quality of the work done were reported by Dr. Walter R. Miles of Stanford University. By making intoxicated rats walk the straight and narrow line of a psychological maze, Dr. Miles showed that the effect of the alcohol was most pronounced when it was being absorbed by the blood stream. Rate of change, whether it be in getting drunk, flashing an electric sign, playing jazz or accelerating a car, controls the impression that the individual gets from the experience, this psychologist contended.

New Cancer Diagnosis

Discovery of a new method of diagnosing certain kinds of human cancers was announced by Dr. George N. Papanicolaou of Cornell Medical College, New York City.

The presence of cancer or malignant tumor is indicated by the changed forms of the cells and white corpuscles of the fluid in certain parts of the body away from the actual location of the cancerous growth. Under the microscope healthy cells and those that have been injured in the fight against the cancer can be distinguished.

Although Dr. Papanicolaou is not willing to predict how useful the new diagnostic method will be in the actual treatment of malignancy itself, it seems probable that it will prove useful in detecting cancer at the very early stages of its growth when it can be most easily fought and treated. There is even hope that precancerous conditions may be detected and checked.

Cancer is caused by normal cells running wild and growing with a vigor that is otherwise shown in only the young, embryonic tissues. Such unruliness of mature cells attempting to create cancers is attacked by those defenders of the body's health, the phagocytes and related cells, many of whom are wounded in the combat and bear the marks of battle that Dr. Papanicolaou observes and uses as a diagnostic indication.

The cancers that Dr. Papanicolaou can detect by his new method are those of the female genital organs and the detecting cells occur in the genital tract. There is hope that the same method of diagnosis will be applied to other fluids of the body, thus locating easily malignant growths in other parts of the human machine.

The discovery was made as a by-product of fundamental work on the nature of sex in women. Following successful investigations of the sexual cycle of guinea pigs and other mammals, the same methods of research were applied to women in health and disease with results that promise to confer real blessings upon the human race just as soon as they are developed and taboos are overcome to allow their application.

Eugenics Urged

Consciously arranging our marriages so that the undesirable qualities of the human race will not be perpetuated in the children is a practical procedure urged by many speakers at the conference. Through the use of the knowledge that scientists have today, by the development of the race consciousness on the part of the intelligent, with enforced eugenic measures for the morons, the criminal and the other incompetent, strides of progress could be made in a few generations.

Cancer could be bred out of the human race if all would follow the laws that Dr. Maud Slye of the University of Chicago has derived from thousands of mating of mice. Susceptibility to cancer is inheritable, her results show, but it is a recessive that can be dominated and eliminated from the race if family histories are very carefully consulted and followed in human matings.

Long life is in part due to a constitutional tendency toward longevity that is inherited from one's parents, said Dr. Charles B. Davenport of the Eugenics Record Office, Cold Spring Harbor, N. Y., who also stressed the necessity of leading a healthful life to live long.

(*Continued on page* 21)

BLACK WHITE or SPECKLED?

THE "COMMITTEE ON THE NEGRO"

organized for the anthropological and psychological studies on the American Negro published its first Anthropological paper in the *American Journal of Physical Anthropology,* Vol. X, No. 2. Dr. A. Hrdlicka, of the United States National Museum reviews this interesting and important subject and gives a bibliography of 269 titles.

Read the Anthropological paper on this great problem in the *American Journal of Physical Anthropology.*

Published by The Wistar Institute of Anatomy and Biology, Philadelphia.

Vaccinate with Pills

Pills of dead bacilli are taken before breakfast for three days in the simple method of immunization against typhoid, dysentery, and cholera now being used by people in large sections of Europe and Asia. The pills are preceded by doses of ox bile in the typhoid and cholera vaccination.

This means of immunization which grew out of animal experiments made at the Pasteur Institute by Prof. A. Besredka is becoming increasingly popular, according to Dr. Harry Plotz, his American assistant. It is being used now extensively in France, Russia, Italy, Spain and India, Dr. Plotz stated in an interview with a Science Service correspondent.

"Vaccination by the mouth is much simpler and easier for the patient," he said. "There are no disagreeable after-effects such as often follow vaccination under the skin and which, in the case of dysentery, proved so disastrous that the subcutaneous method was abandoned.

"It is also more rapid in its immunizing power. We have proved experimentally that immunization takes place a day or two after the last dose of vaccine is given."

Moreover, the new method is quite as effective as the old, he stated. Statistics show that in various typhoid and cholera epidemics where both methods were used, vaccination by the mouth was equally effective, and, in some cases, more so. Just recently Lt. Col. A. J. H. Russell in a report to the medical section of the League of Nations showed that he had found vaccination by the mouth and vaccination under the skin to be of equal effectiveness for cholera. He drew these conclusions after extensive vaccinations in towns in India, using both methods. Col. Russell is Director of Public Health, Madras, India. Vaccine by the mouth was given 4,982 persons. Of these 18 contracted the disease with 4 deaths resulting. In other words the percentage attacked was 0.36 with the deaths 22.2 per cent. of those. Among 11,004 unvaccinated controls, 222 contracted cholera and 93 died making the percentage 2.02 attacked of which 41.9 per cent. died. Vaccine under the skin was given 8,485 persons of whom 31 contracted the disease, 2 dying. The percentage attacked was then 0.37 and the mortality 6.5. Of 29,254 unvaccinated controls in this experiment 489 con-

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Disfranchise Morons to Save Race

(*Report on Race Betterment Conference, continued from page 20*)

Votes for the intelligent only! This slogan may figure in the campaign of science for race betterment if the recommendations of Dr. William J. Hickson of Chicago, the director of the world's largest crime clinic, are followed.

To rescue society from the unfit and criminal who threaten to engulf it, he urged radical action. Speaking of the necessity of coping with the crime problem, he said:

"If we continue with a political and social system which takes no account of varying mental endowments, nothing will be done and nothing can be done. If we face the issue bravely and revise and adapt our institutions in such a way that superior intelligence and exact knowledge can function, we will be on the way to riddance from great evils and to immeasurable enrichment of life.

"Proportional voting will go a long way toward accomplishing this result. It is working satisfactorily in Europe. While this challenges all our cherished slogans of equality and democracy, I favor the granting of the franchise on the basis of the intelligence quotient."

As a result of examining 40,000 criminals over a period of twelve years, Dr. Hickson has arrived at the following conclusions, which dictate his plea for a new system of franchise:

Criminals can not be reformed. They are constitutionally defective. They bred from the inferior classes that have more children than the law-abiding superior classes. Modern economic conditions and the era of plenty in which we live allow the criminal producing classes to flourish and people the earth more effectively than ever.

The two per cent. of the population that is mentally defective is the two per cent. that becomes criminal. Yet, Dr. Hickson said, this small fraction of the population absorbs more than 35 per cent of the taxes of the nation. It keeps the good 98 per cent. of the population uneasy and fearful.

Science recommends that mentally defective, detected in youth, shall be prevented from committing crimes by being segregated and that the defectives also be prevented by sterilization or other methods from reproducing their own kind. This is the cure for crime, in Dr. Hickson's opinion, instead of the present antiquated legal method of exacting an eye for an eye. Punitive methods have failed, and while Dr. Hickson holds no brief for uninformed sentimentality toward crime and criminals, he believes that "unenlightened good-will may be and often is worse than useless."

Indians Absorbed

The redskin is vanishing! Although the total number of Indians still left in this country has not diminished markedly in recent years, the aborigine American race is working out its own salvation by blending its blood with that of the white men who conquered the continent they once owned. And this, Dr. Frederick L. Hoffman, insurance statistician of Newark, N. J., declared to the scientists, is the real solution of the Indian problem. At present well over a third of the Indians are mixed bloods. To protect the remaining Indians from the destructive diseases of the white man, to make him mentally feel that he has a place in the world, Dr. Hoffman urged continued support of the efforts of the government toward an adequate health service for the redmen.

Dangers in Race Mixture

The greatest danger before the American people today is the blending of the negro tenth of the population into the superior blood of the white race, Dr. Ales Hrdlicka, anthropologist of the Smithsonian Institution, Washington, warned the conference in a communication.

Compared with this danger, which some think will be inevitable, the influx of the so-called inferior white races is considered by Dr. Hrdlicka to be a minor matter.

The white and black races are so different that anthropologists, judging from observations of race mixtures, predict that the white race would be weakened and fundamentally changed by taking into its blood stream the inferior strain of the negroes now living among us.

Blendings of races are not always harmful, and where the two peoples are somewhat similar and have good qualities, the new race may even be better than the old. Dr. Hrdlicka attacked the idea that the white stock of America would necessarily be deteriorated by the lowering of immigration bars to the fit members of any

(*Just turn the page*)

Race Betterment Conference

(*Continued from page 21*)

group of the white race. In fact, it might be wise, he said, to have an influx of new blood occasionally in order to prevent the race in America from degenerating for the same biologic reason that an animal breeder sometimes introduces a new strain in his stock.

Poisonous Proteins

Some of the proteins that are being consumed daily by all who eat should be labelled with a skull and crossbones when they are indulged in to excess. Not all proteins are bad; in fact, small amounts of those proved poisonous in excess are necessary for robust health. Protein is, of course, only one of the energy food triology —fats, carbohydrates and proteins.

Dangerous diseases of the arteries, kidneys and liver are caused by only two or three times the minimal protein requirement, Dr. Louis H. Newburgh, of the University of Michigan, told the conference in reporting the results of twelve years' investigation of the effect of these food factors on human health. Danger to the race lies in the fact that great groups of human beings habitually consume the amounts that are known to produce disease.

Warnings can not be given against particular foods but in general milk and vegetables contain less of the harmful protein elements than animal foods. Most injurious are the proteins in the glandular organs, such as liver, kidney, etc.

The proteins themselves are not simple food elements but are built of about twenty compounds, called amino acids, that are the same no matter what food they occur in. Professor Newburgh fed rats on diets containing excessive amounts of the amino acid tryptophane and the animals acquired a serious liver disease in two weeks. Cystine, another protein building block, killed rats in a week by destroying the liver and kidneys. Other simple amino acids were quite inocuous.

Casein, the principal milk protein, was given a good recommendation by Professor Newburgh and called one of the least injurious to human beings.

Little Hope for Rejuvenation

The human hope for rejuvenation was badly shaken by evidence presented by Dr. W. N. Boldyroff, director of the Pavlov Physiologic Institute, who was a collegue of the famous Russian scientist, Pavlov, before the Soviet regime.

Classifying all vital phenomena in two contrary groups, useful or pleasant processes and harmful or unpleasant processes, Dr. Boldyroff has concluded that the pleasant or useful acts lose their power or charm by frequent repetition while the harmful acts become worse with the practice of them. Rest intervals enhance the pleasure and counteract the harm.

Applying his new basis for a physiological morality to the problem of rejuvenation, Dr. Boldyroff showed that the brain of man would be exhausted and become blase in old age even if medical science could replace his worn out glands and body with fresh, youthful ones.

Sleep is explained by Dr. Boldyroff as nature's way of making the mind and body rest in order that it may be fit to carry on the next day. Narcotics can not perform this function. While they destroy consciousness they do not actually put the brain to sleep in the same way as natural rest.

New Religion Needed

A new religion based upon the simple facts of life, teaching that life is immortal through the germ plasm, and urging youth to take the best sex partner in order to perpetuate and create a better race was demanded by Dr. Aldred Scott Warthin, director of the pathological laboratory of the University of Michigan. Youth today in the colleges and elsewhere is abandoning the old religious faiths based on superstition and a new religion based on science, teaching there is no forgiveness of sin, is needed to promote the evolution of the race in Dr. Warthin's opinion.

Desex Criminals

Desexing of murderers, burglars, and low-grade morons who exhibit their bad qualities in school life, was advocated by Dr. Henry F. Vaughan, Detroit Commissioner of Health. Those of low intelligence so treated in childhood would be allowed to marry under his plan in order to stabilize them and make them as useful as their qualities permit.

Declaring that 200,000 of our national feeble-minded population of 300,000 have appeared in families where normal parents are carrying the taint in half of their germ cells, Prof. E. M. East of Harvard suggested that individuals in such families should be dissuaded from marrying close relatives or taking mates that have a heredity similar to their own.

Science News-Letter, January 14, 1928

Vaccinate by Pills

(*Continued from page 21*)

tracted the disease, 184 dying. The percentage attacked was 1.67 and the percentage of mortality 37.6.

Professor Besredka's theory which led him to experiment with oral vaccination is a very simple one, Dr. Plotz explained. It is simply that it is logical to vaccinate the organ that is infected during the course of the disease. In the case of dysentery, typhoid and cholera, the germ enters by way of the mouth and produces the disease in the small intestine. Then why not vaccinate by the mouth, he queried, and emulate mother nature as much as possible? This is a far more direct way for the vaccine to reach the intestine than through the skin.

But to immunize against typhoid and cholera Prof. Besredka found that it is necessary to administer ox bile first. Bile prepares the mucous membrance of the intestinal wall to receive the dead bacteria which are given by the mouth. It removes the mucous and prepares for the absorption of the vaccine which might otherwise slip through the intestinal tract. In the case of dysentery, however, the bacteria in the vaccine are capable of performing this function themselves.

American workers in this field regard Dr. Besredka's figures as interesting and encouraging but are of the opinion that they cannot be accepted at their face value alone. Interpretation of such fundamental experiments, they maintain, is not entirely acceptable without further confirmation.

Science News-Letter, January 14, 1928

Some of the Egyptian Pharoahs were left-handed.

A British investigation indicates that stammering is twice as frequent among boys as among girls.

The largest storage battery locomotive in use has a battery weighing 39 tons, and can haul a 1,500-ton train.

New evidence that Greenland once had a tropical climate has been brought to Denmark by Dr. Lauge Koch, Arctic explorer.

The European corn borer is reported in 55 Ohio and 14 Indiana counties now, as compared with 42 Ohio and eight Indiana counties last year.

VOLCANOLOGY

Traffic Risk Greater than Volcanoes

"Crossing city streets is the great risk I incur in my travels nowadays." This was the statement made the other day by one of the world's greatest experts on volcanoes, Dr. Immanuel Friedländer, director and founder of the Volcanological Institute at Naples. In the course of his wanderings, Dr. Friedländer was once captured by Mexican bandits, and has had many experiences with live volcanoes, but he refuses to admit that the career he has adopted is any more dangerous that other professions. He is visiting America in order to interest American scientific men in the study of volcanology.

Born in Germany, Dr. Friedländer acquired ample means in the business world and was able to divert a large part of his time and attention to scientific pursuits. In 1913 he founded and endowed in Naples the Volcanological Institute, and at the same time he launched what was then the only volcanological journal in existence. The World War swept away a considerable part of his fortune and also seriously curtailed the resources of the Institute, but its work is still going on under Dr. Friedländer's direction.

This unique establishment occupies a beautiful building on the heights overlooking the Bay of Naples within a few miles of Vesuvius, the world's most historic volcano. The Institute comprises large physical and chemical laboratories, a seismological station, a museum of volcanic rocks and minerals, gathered from far and wide, and a volcanological library. The staff under the director includes three salaried assistants and two volunteers. A number of important researches have been carried out. The institute is now engaged in an elaborate study of the volcanic island of Ischia, near Naples.

Asked about the economic value of volcano research, Dr. Friedländer emphasized the fact that it is a short-sighted policy to encourage only those scientific investigations that promise to be of immediate utility. At the same time he pointed out how often it has happened that research in pure science, undertaken with no thought of practical applications, has contributed immensely to the material prosperity of mankind. When Galvani experimented with frogs' legs, no financially profitable outcome was to be anticipated—yet these experiments became one of the corner-stones of the great electrical industry of today. Röntgen did not dream of the many uses that would be made of the X-rays at the time he discovered them, nor did Hertz foresee the wonders of wireless telegraphy, based on his discovery of electromagnetic waves.

"As for volcanology," said Dr. Friedländer, "there are at present very few specialists connected with this subject, and only a meager number of research institutions and observatories. The financial resources at the command of these establishments are ridiculously small compared with the millions spent on astronomy. Surely the physics of the globe on which we live ought to be studied as thoroughly as the phenomena of distant stars!

"A more intimate knowledge of volcanism would lessen materially the danger to life and property in volcanic regions, including such parts of the American domain as California, the Hawaiian Islands, Alaska and the Philippines. Explorations of volcanic areas are likely to lead to the profitable exploitation of volcanic products, useful in agriculture and other industries, including potash, silicates, sulphur, acids, etc.

"The huge reservoir of volcanic energy represented by the heat of rocks and gases could undoubtedly be tapped in many places and used for power production. Up to the present time the only successful undertaking in this line has been at Lardarello, Italy, where thousands of kilowatts are produced from volcanic steam and used for power and lighting in the city of Florence. I believe that in time to come the greatest of all sources of power will be found in the subterranean storehouses of volcanic regions, where the internal heat of the earth can be reached at a relatively shallow level. The limited supplies of coal and oil in the earth will be exhausted in the comparatively near future. The waterpower available in rivers is already to a large extent taken up. Water-power from the tides will probably prove costly to utilize, and the same is likely to be true of any method now in sight of using direct solar energy. In both cases the receiving apparatus must occupy very large surfaces and cannot work economically. On the other hand, no insurmountable obstacles seem to exist to tapping the earth's internal heat on a vast scale, and volcanology is paving the way to this accomplishment."

HYGIENE

Coffee Called Beneficial

Devotees of the coffee cup will welcome the glad tidings, announced by Prof. Ralph H. Cheney of the biology department of New York University, that coffee is not only harmless but beneficial.

"Evidence derived from my study of the effect of coffee on animals and man," Prof. Cheney declared recently, "indicates that the properly prepared beverage is highly advantageous with respect to over 90 per cent. of normal individuals. Judging from the effect of aqueous solutions of caffeine or of the coffee beverage taken through the stomach in the 1.5 grain quantities such as exist in the average coffee cup, the reasonable use of coffee is a great blessing to man. To be sure, caffeine is a drug and its use can be abused but acute injury, as far as the caffeine content is concerned, would necessitate the consumption of over 150 cups which is, of course, ridiculous.

"Psychological responses of amiability and a sense of well-being and good cheer are undeniable accompaniments of the coffee beverage and the physiological effects are also non-injurious and gratifying. Temporary relief from hunger and fatigue is a general result and light headaches, due to other than gastric disturbances, are commonly alleviated. Coffee serves as a mild stimulant of

(*Just turn the page*)

GEOLOGY

Greatest Landslide Coming

The movement of a 5560 foot high mountain, Monte Arbino, near the Swiss-Italian border at Lake Maggiore will probably cause one of the greatest landslides in Swiss history before long. As the result of a warning by the Federal Geological Survey towns in the path have already been evacuated.

The chief town in danger was the village of Arbedo, which is now deserted. This is right in the path of the expected slide, but nearby Bellinzona, and other towns may also be endangered by the after effects of the slide. The Arbedo valley is steep and narrow and with such a large mass of soil and rock falling into it a dam perhaps a thousand feet high would be formed, holding back the waters of the Traversagna river, which will collect as a lake. It will not take long for the dam to be worn down or burst and then the flood will rush down the Ticino valley, in which Bellinzona and other towns are located.

The mountain has been moving

(*Just turn the page*)

Coffee Beneficial

(*Continued from page 23*)

the heart, brain and muscles, thereby accomplishing greater power and coordination in mental and physical endeavors.

"The oustanding fact to be heralded in favor of coffee is the absence of any after-effect or subnormal, recuperation period. It does not seem to be habit-forming since satisfactory stimulation does not require continually enlarged quantities. No other beverage produces equal stimulation without deleterious after-effects. On this basis, it is safe to say that coffee, prepared by subjecting the ground bean to water just below the boiling point for 5 minutes or even somewhat longer in most household percolators, is not injurious to adults in normal health who show no acute idiosyncrasy regarding caffeine or other substances in the beverage."

Coffee is an impressive example of a plant, Prof. Cheney pointed out, whose economic importance has been raised to great heights by its successful planting in a locality entirely foreign to its natural distribution since it is indigenous to Africa and Asia and is raised principally in Brazil and Colombia. The United States is the largest consumer, coffee imports being exceeded only by sugar and raw silk.

Science News-Letter, January 14, 1928

Greatest Landslide

(*Continued from page 23*)

since 1888. The Geological Survey first called attention to it in 1905, as the summit had then moved over six feet to the east. In the last 22 years it has gradualaly been increasing its motion, until, during 1926, it moved a foot. At the same time it has been getting lower, about fourteen inches in 1926. An area of about 2500 square yards is covered by the moving part. Trees on the slopes are now leaning considerably, and occasionally falls of rock and soil occur, which are doubtless small compared with what will come when the big crash happens. The Survey expects this to happen before long, and states that nothing can be done to avert it.

The last great mountain fall in the Alps was in 1881, and, unlike the coming one, was due to human activity, in quarrying slate at the base of a mountain known as the Plattenbergkopf. Warning cracks appeared years before the fall, but these were disregarded, and so the village of Elm, in Canton Glarus, was destroyed, along with 120 of its inhabitants.

Science News-Letter, January 14, 1928

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Neanderthaler Our Grandparent?

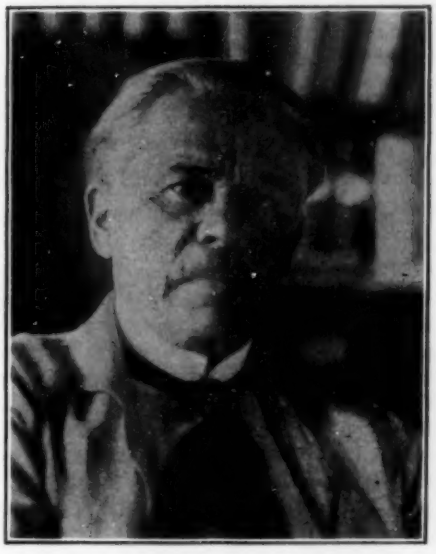
(*Continued from page* 18)

of paralyzing notions concerning one of the main early phases of humanity, is a serious obstacle to further progress, and deserves all possible attention. Thus even if, without further material, it is possible to do little more than to bring perhaps into the subject a greater degree of order and comprehensiveness; to point out here and there facts that have not been sufficiently weighed; and to call attention to some of the inconsistencies in the prevalent assumptions."

For the purposes of his discussion, Dr. Hrdlicka identified Neanderthal man with the people and culture known to science as Mousterian. This name again is derived from a place, Le Moustier, in France, the scene of discovery of a Neanderthal skeleton associated with implements and bones of a clear-cut and definite type. For Dr. Hrdlicka Neanderthal man and Mousterian man mean the same thing; "Mousterian" is a little more convenient because the name has a single well-understood meaning, whereas there has been some tendency to associate the name "Neanderthal" with several different types of cultural relics. The Mousterian was the last of the subdivisions of "pre-modern" time. When it passed into the next period, the Aurignacian, the first of the modern-looking skeletons of the Cro-Magnon type appears.

It was on the line between the Mousterian and Aurignacian remains, and on the assumption that this line marks a sharp and abrupt division between two utterly alien races and cultures, that Dr. Hrdlicka trained his artillery of scientific criticism. He calls in as witnesses the bones of contemporaneous animals, the geological condition, the location of the dwellings and the remains found in them, the type of tools, the primitive drawings and sculpture found on the rock walls; and, finally, the skeletal remains of man himself.

"Mousterian man begins during the latter part of the last great interglacial and extends deep in the final glacial time, without perceptible direct relation to the fauna. His remains at Montieres, Villefranche, Ehringsdorf, the rock shelter Olha, some of the Mentone caves, and elsewhere, show still the remains of the ancient elephant, the Merck's rhinoceros, the large lion, and the panther. On the other hand, various arctic species come in as the cold advances during the Mousterian,



DR. ALES HRDLICKA, famous anthropologist of the U. S. National Museum, who says that we are descended from the Neanderthal race

without marking either its beginning or its end.

"There is, therefore, no definite line of faunal demarcation for the beginning and none for the end of the Mousterian period. Which, as will be seen later, are also facts of some importance.

"Geological information about the Mousterian period is not as precise or full as might be desirable; but it permits of several valuable conclusions.

"A survey of the better known Mousterian sites, from Germany and Belgium southward, shows that fully one-third of them were in the open, while of the remainder quite a few are found in and about shallow rock shelters that could not have afforded much protection. In Switzerland, moreover, the earlier Mousterian man lived in caverns at a high elevation (Wildkirchli, 4905 feet; Drachenberg, 8023 feet). All of which indicates that the climate during a considerable part of the Mousterian period was not severe enough to generally drive men into the caves, or even down from the mountains, thus pointing to interglacial rather than glacial conditions.

"The cultural remains of the Mousterian in the open stations as well as those in caves, denote both considerable age and long duration of the period. In the open the remains lie mostly in old gravels or sand, rarely in clay or loess, or in travertine rock laid down in old lake bottoms. There may be two or three cultural strata or horizons, indicating a repeated occupation of the same site after shorter or longer intervals; though there have not been found so many occupational layers as in some of the caves.

"Neither paleontology nor geology explain the Neanderthal man; let us see what we may learn from archæology.

"The essential archæological questions are, how does Mousterian man differ in habits and arts from the man that preceded him, and from him that followed; and are the differences, or are they not, substantial enough to brand him as something apart from either his predecessors or his followers?

"The chief activities of man in nature relate to his housing, to the obtaining and preparing of food, and to the manufacture of his tools, utensils and weapons. Let us see briefly how the Neanderthal man compared in these respects with his forebears and his followers.

"There is a prevalent idea that the Neanderthal man was essentially a cave dweller, and this idea seems generally to carry with it a sense of inferiority. The records now available throw a different light on this matter. Analysis of 360 better-known paleolithic sites in Europe and the neighboring regions show some curious and important facts. Man begins seemingly as wholly a dweller in the open; but since the warm Chellean already he commences also to utilize the rock shelters and caverns, and then as the climate cools he gradually takes more and more to the caves. In these phenomena the Mousterian period shows nothing striking, nothing individual. It falls harmoniously into the curve of the progress of cave dwelling, to be followed equally harmoniously by the Aurignacian and the succeeding periods. Mousterian man occasions no disturbance in the human housing conditions of the time, and what is even more striking, no disturbance or change whatsoever is occasioned by the advent of the Aurignacian. The Aurignacian man follows in the footsteps of his predecessor without any interruption. Like the Neanderthaler, he builds, in the open, huts of perishable materials that leave no trace, and he utilizes the caves exactly as much and eventually even more than the Neanderthal man. He continues, in fact, on the same sites and in the same caves that the latter has used, without introducing any innovation. He also, like the Neanderthal man, leaves here and there a whole series of occupational strata, which testify to much the same habits of life. Yet

(*Just turn the page*)

Neanderthaler Our Grandparent?

(*Continued from page 25*)

the Aurignacian man is represented as as newcomer, of a different species from that of the Neanderthaler, and mentally vastly superior.

"The Mousterian period is characterized by a definite phase of stone industry, but so are all the periods before and after it. It has no abrupt beginning. It uses flint where this can be had, as do all the other industries; where flint is absent or scarce, it employs quartzite and other stones. The use of bone begins in the Mousterian, to increase henceforward. The period shows three stages of evolution, the lower, middle and upper, as do also later on the Aurignacian and the Magdalenian periods. The implements range from crude to beautifully made; the technique is partly different from, but in general not inferior to, either the late Acheulean or the earlier Aurignacian. And there are indications that there was no sudden ending.

"On the whole, the Mousterian industry, though characteristic, does not give the evidence of something entirely new and strange, intercalated between the Acheulean and the Aurignacian, beginning abruptly by displacing the former and ending suddenly through displacement by the latter. There is in fact much at either end that appears to be, more or less, of transitional nature.

"The Aurignacian period does not appear to come in full fledged, as is sometimes taken for granted, but to develop locally, both in industry and art, from humbler beginnings. It may, moreover, be unjust to assume that the Mousterian man was devoid of art sense. He may not have left any designs in caves (though that is not perhaps absolutely certain), but the same is true of the Neolithic and many other early as well as later populations. That the Mousterians may not have been lacking in artistic sense is indicated by some of their beautiful implements from La Quina and other stations, by the decorated bone fragment from La Ferrassie, and possibly by the *pierres-figures*, and used chunks of manganese oxide, found occasionally in the Mousterian deposits."

Finally, Dr. Hrdlicka wants to know, where did this hypothetical invasion of a new and superior people come from?

"The sponsors of the notion that the Aurignacian man was a man of different and superior species to the man of the Mousterian period, conceive him for the most part, apparently, as an invader who has come from somewhere outside of the Neanderthal area, overwhelmed completely the established less capable species, and annihilated or at least wholly replaced it, over all the great domain over which it once extended. These ideas, however, are never expressed very clearly and little thought is given to the incongruities they involve.

"They would imply, first of all, the invasion of Europe during the height of the last glacial invasion. This is not in harmony with the main laws of human and biological spread, namely: Movement in the direction of least resistance; and movement in the direction of better material prospects, which are first of all climate and food. In the entire history of Europe the movements of men have tended always toward a place in the sun and away from the cold.

"Such notions postulate, next, large numbers of the newcomers, to suffice for the vast task. But such large numbers would necessarily mean somewhere near a still larger mother population. And there is no trace, either in western Asia or northern Africa, the only regions from which such invasions at those times would have been practicable, of any such Aurignacian population.

"It is a very serious question whether in the paleolithic times, without a tamed animal, without stocks of non-perishable food, dependent wholly on hunting without lance or the bow and arrow, and in the imperfect social organization of that time, any larger armed invasion was feasible. A peaceful extension, on the other hand, would not lead to the annihilation or expulsion of the invaded population, and if small or gradual, would lead to an amalgamation with, rather than the extinction of, the native stock. A complete displacement by any agency is difficult to conceive, and there would remain the fate of the displaced people.

"It stands to reason that these great difficulties must be satisfactorily explained away before there can be a general intelligent acceptance of an Aurignacian invasion with Mousterian extinction."

When he comes to the most crucial point of all, the evidence presented by the human skulls and bones themselves, Dr. Hrdlicka is by no means convinced that this Neanderthal-Mousterian race lacked all links to connect it with the proud "modern" man who succeeded it. "Typical" skulls indeed show the high, near-gorilla like eyebrow ridges, the heavy jaw with receding chin, the low-topped brain case, the primitive teeth and other features that mark it as definitely below the level of present-day men. But certain of the skulls, especially among the more recent well authenticated discoveries, depart from the strict orthodoxy of Neanderthal structure. In some the eyebrow ridges are less pronounced; some have bigger, higher and more modern brain cases than their fellows; the recently discovered Galilee skull, the even later second Gibraltar and the very recently discovered Weimar skull, have distinct marks of advance towards the cranial type of the man of today. These variations indicate, Dr. Hrdlicka states, a state of active evolution in this race, which therefore may well be regarded not as an old species ready for extinction, but as a *phase* or stage in the development of man, ready to give rise to another, the modern type. *Homo neanderthalensis* moves thereby back to the main stem of the human family tree, and becomes simply the Neanderthal phase in the evolution of *Homo sapiens*, which seems entirely more natural.

Science News-Letter, January 14, 1928

Birds' bills sometimes become worn, as men's teeth do.

The malaria mosquito is a dreaded enemy of the eastern rubber planter.

The catch of king salmon in California has fallen off so that the future of this fish is threatened.

A method of sheathing radium to prevent the rays from causing burns has been developed by Mme. Marie Curie.

A new green food dye from coal-tar is to be officially approved as safe for eating purposes by the government.

One-fourth of the rain that falls in the forest is caught by tree leaves and branches, and most of it never reaches the soil.

The Age of Bronze was ushered in when ancient men learned to produce a hard serviceable metal by mixing tin with copper.

A stone ball shot from a Roman catapult during the Roman siege of Jerusalem has been found there in excavating the third wall of the city.

Weather Service for Aviators

An experimental weather service for aviators will be inaugurated shortly on the Chicago-Cleveland airway as a demonstration of just what airmen need to know about the meteorological conditions of their flight.

The newly organized Daniel Guggenheim Committee on Aeronautical Meterology has drawn up plans for this experimental service under the direction of the United States Weather Bureau. This Bureau is already supplying meteorological information to airmen to the fullest extent possible but the work will need to be greatly expanded in the immediate future.

No problem of applied meteorology is beset with greater difficulties than that of providing an adequate service of weather reports and forecasts for aviators. With the rapid growth of commercial airways this problem has reached an acute stage.

The Guggenheim Committee, with headquarters at the Weather Bureau office in Washington, has formulated a number of suggestions relating to future work in aeronautical meteorology. One of these is that in place of the present plan of issuing weather information and forecasts from a few centers, each serving an area that embraces several states, this work shall be handled hereafter by a much larger number of meteorologists, each of whom shall be stationed at an important airport and shall confine his attention to the airways radiating therefrom.

Inquiry among aviators themselves reveals the fact that what they want chiefly from a meteorological organization is information concerning the state of the weather along the airway at the moment of starting a flight and an accurate forecast for the short period of not more than three or four hours required to reach their destination. It is quite impossible to give this information satisfactorily from a distant forecast center.

There are still other types of information that cannot well be given except by a meteorologist located directly on the airway. For example, in the operation of the air mail lines the question often arises: If weather conditions along the route are unfavorable at the scheduled time of departure, should the mail immediately be sent by train or should the flight be postponed for some hours in expectation of improved flying conditions? The answer to the question implies familiarity with traffic problems on the line and reports from a local network of stations, observing at short intervals of time.

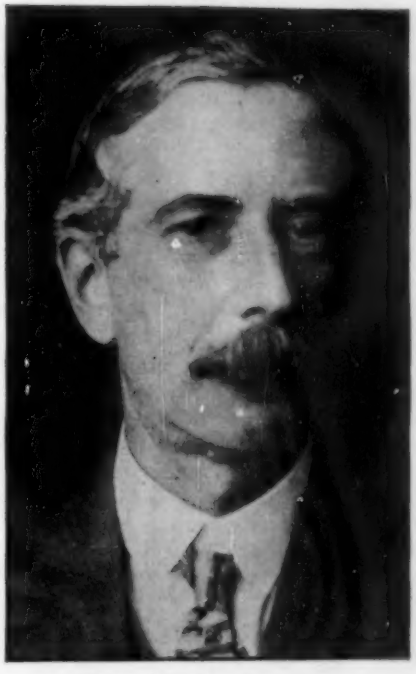
According to the plans outlined by the committee, the headquarters of each local service will be known as an "airport station," and will receive frequent reports from a comparatively dense network of stations along and adjacent to the airway which it serves. Some of these will be regular Weather Bureau stations, but the majority will be stations especially established for this work and manned by part-time observers. The airport station will also receive reports from the country at large, such as are used in the ordinary work of weather forecasting.

In the forthcoming experimental service airport stations will be located at Chicago and Cleveland. The former will be surrounded by a network of about 27 stations and the latter by about 21. Bi-hourly reports from these stations are contemplated, each containing the following information: 1. Weather. 2. Cloudiness. 3. Cloud forms. 4. Past weather. 5. Height of "ceiling." 6. Visibility. 7. Wind. 8. Temperature. 9. Barometer. 10 Condition of landing (from stations located at emergency fields).

These reports are to be telephoned to the airport station, and special arrangements have been made by the telephone companies, involving the exclusive use of wires and the cooperation of telephone exchanges, so that the collection of the reports may be accomplished in the shortest possible time. Cleveland and Chicago will exchange by telephone the reports they collect and the forecasts and advices they issue, using a leased wire for the purpose.

Experiments in broadcasting weather information to aircraft in the air will probably be included in the forthcoming undertaking, and doubtless other features will develop after the service is inaugurated.

A corollary of the plans drawn up by the Guggenheim Committee is that a pressing need will probably arise in the near future for expert meteorologists to operate the numerous weather services along airways. It therefore behooves the universities and technical schools to undertake without delay the training of young men for such work.



CHARLES GREELEY ABBOT

New Smithsonian Head

Years of study of the sun's radiation and its variability, invention of an improved instrument for measuring this radiation, researches on solar physics in general and the invention of a solar cooker that makes use of the heat from the sun—all these things make Dr. Charles Greeley Abbot, who has just been elected secretary of the Smithsonian Institution, one of the leading students of the sun. In electing him to this important office, the Board of Regents of the institution has returned to a precedent set years ago, when they elected Dr. Samuel P. Langley, who was also one of America's most eminent astronomers, to the post. Dr. Langley, who is best remembered for his pioneer work in aviation, was immediately succeeded by Dr. Charles D. Walcott, who died last year.

Probably the most important research that has been carried out under Dr. Abbot's direction is the measurement of the solar constant. This is the intensity of the solar radiation as it would be from a point outside the earth's atmosphere, and at the average distance of the earth from the sun. Measurements to determine this have been made for twenty years from observatories operated by the institution in a number of different parts of the world. The most recent station is one that was established two years ago on a mountain in Africa, among the Hottentots.

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160 Logic
170 Ethics
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190 Modern philosopers
200 RELIGION—
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220 Bible
230 Doctrinal. Dogmatics. Theology
240 Devotional. Practical
250 Homiletic. Pastoral. Parochial
260 Church. Institutions. Work
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430 German
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460 Spanish
470 Latin
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490 Minor Languages
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510 Mathematics
520 Astronomy
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550 Geology
560 Paleontology
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580 Botany
590 Zoology
600 USEFUL ARTS—
610 Medicine
620 Engineering
630 Agriculture
640 Domestic economy
650 Communication. Commerce
660 Chemical technology
670 Manufactures
680 Mechanic trades
690 Building
700 FINE ARTS—
710 Landscape gardening
720 Architecture
730 Sculpture
740 Drawing. Decoration. Design
750 Painting
760 Engraving
770 Photography
780 Music
790 Amusement
800 LITERATURE—
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820 English
830 German
840 French
850 Italian
860 Spanish
870 Latin
880 Greek
890 Minor languages
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Classics of Science: Nutrition of Germs

Pasteur by the methods here described proved that the molds and similar organisms which seem to spring up from nowhere grow from spores floating in the air, instead, as was widely supposed, of coming into being from the organic material on which they flourish. Make up culture media according to his formula, expose it in Petri dishes for a short time to the air of the room, cover and incubate at room temperature. Compare the growths on the different media. As a control, sterilize one such solution by boiling, pour into a sterile dish and cover immediately.

OEUVRES DE PASTEUR réunies par Pasteur Vallery-Radot Paris, 1922. Specially translated for the SCIENCE NEWS-LETTER.

Spontaneous Generation

In quoting here the principles of the systems of spontaneous generation which have been most widely held, my principal aim is to show that, in all, the essential role is played by the organic material of the infusions. By itself, it would act with the special properties acquired in the course of its earlier formation under the influence of life.

The albuminoids will conserve in some manner a residuum of vitality, which will enable them to organize themselves upon contact with oxygen, when the conditions of temperature and humidity are favorable.

We come to recognize that these opinions are entirely erroneous, and that the albuminoid materials are only a food for the germs of the infusoria and of the mucedins; that they have no other role in the infusions for it is possible to replace them with crystallizable material, such as salts of ammonia and phosphates.

Thus all the theories relative to the spontaneous formation of the lowest forms of life find themselves deprived of one of their essential foundations.

Inorganic Media

Experiment has shown me, in fact, that it is possible to replace, in the experiments in chapters IV, V, VI, the sweetened solution of brewers' yeast, the urine, the milk, etc., by an infusion made up in the following manner:

Pure water	100
Granulated sugar	10
Ammonium tartrate	0.2 to 0.5
Ashes from brewers' yeast	0.1

If one sows in this liquor, in the presence of calcined air, the dust which exists in suspension in the air, he sees the bacteria, the vibria, the mucedins, etc. spring up there. The albuminous, nitrogenous substances, the fatty substances, the essential oils, the coloring matters characteristic of these organisms, form from each bit with the aid of the elements of ammonia, phosphates and sugar.

Make up the liquor in the same manner with the addition of lime.

Pure water	100
Granulated sugar	10
Ashes of brewers' yeast	0.2 to 0.5
Carbonate of lime, pure	3 to 5 gr.

and the same phenomena will be produced, but with a more marked tendency toward the fermentations called lactic, viscous, butyric, and all the vegetable and animal ferments belonging to these fermentations will originate simultaneously or successively.

(Just turn the page)

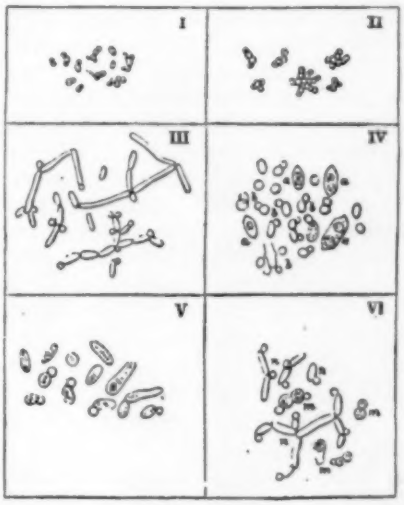

FIG. 12.

We append drawings of the *tortulae* found in the six laboratory basins (see Sketches I, II, III, IV, V, VI, of Fig. 12). The abundance of the germs of these organisms in our laboratory is very striking, and is doubtless due to the nature of the work carried on there, as well as to the power of endurance peculiar to the germs, or the minute vegetative cells of these microscopic plants—a tenacity of life which prevents them from losing their reproductive powers, even after being dried up into dust. But varied as are the formations represented in Fig. 12—and it will be observed that in IV and VI we have shown four distinct forms, marked *a, a; b, b;* m, m; n, n, respectively—it must not be supposed that they correspond necessarily to distinct species. From the ends of a compound organism like those in No. III, a little spherical cell may detach itself and then, by a process of budding, give rise to a series of other minute spherical cells reproducing the form shown in Nos. I and II.

Stars May Be Liquid

A new answer to the old question, "Twinkle, twinkle little star; how I wonder what you are!" is supplied by Prof. J. H. Jeans, famous British astronomer, who now proposes that stars may be largely liquid. Previously astronomers almost universally have supposed that with the high temperatures involved, stars could be nothing but great bubbles of gas.

In a communication to the Royal Astronomical Society, of which last year he was president, Prof. Jeans points out that the fact that so many stars in the sky are double favors his theory. These double, or binary, stars, consist of two separate bodies, that revolve around their center of gravity. It is supposed that many were originally single bodies, but that they divided in some way, thus producing two.

If, however, the star was made of gas, such fission would not take place, but a certain part of the gas would be expelled from the star's equator. But if the star had a liquid core, Prof. Jeans believes, such division could take place. In any condition, he believes, the outer part of the star would still be gaseous.

On the basis of this theory, Prof. Jeans has worked out a modification of the accepted ideas of the evolution of the stars. He thinks that at different temperatures the atoms of which the star consists are of different sizes. This is because they are "ionized," which means that the outermost of the rings of electrons of which they are partly made, are broken off. The star gradually contracts and gets hotter, thus stripping off more of the rings of electrons. Occasionally there may be short periods where the star is gaseous, but then the center becomes liquid again, and it is again stable for a time.

The final state of the star is what is called a white dwarf. In such a star all of the rings of electrons have been removed, and consequently there can be no further contraction. "This state of complete ionisation," says Prof. Jeans, "provides a sort of 'cold storage'—if the metaphor is not too inappropriate to a temperature of about a thousand million degrees—in which stellar atoms, no matter how great their normal generating capacity, are preserved from decay."

"Possibly," he continues, "the nuclei of the spiral nebulae constitute vast storehouses of such matter which only begins to undergo

(Just turn the page)

Liquid Stars

(*Continued from page 29*)

annihilation and to emit radiation when it is first formed into stars." The life of a particular star, known as Plaskett's star, one of the white dwarfs, he says, "can hardly have been more than some 100,000,000,000 years, but the atoms of which it is composed may have previously lived an infinitely longer life, completely ionized at the center of a nebula, and therefore stagnant and immune from annihilation. As a corollary, it would be difficult to deny that all the matter of the universe may have been created at the same instant."

Though the normal evolution of a star seems to be from one stage to another, Prof. Jeans thinks it possible that a star may slip, and fall down several steps at once. "It is slightly disconcerting," he says, "to notice that our sun is perilously near to the dangerous left-hand edge of the main sequence, so that its collapse into a feebly-luminous white dwarf may start at any instant."

Science News-Letter, January 14, 1928

A wooden wardrobe found at Pompeii is the first well-preserved wooden furniture from the ruins of the buried city.

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Nutrition of Germs

(*Continued from page 29*)

I shall publish shortly a detailed work on the results that I have obtained in these studies, which have always seemed to me to offer a great deal of interest on the question of the so-called spontaneous generations.

It is on this account that I have been led to undertake the following experiments the success of which has exceeded my expectations.

In pure distilled water I dissolve a crystallized salt of ammonia, some granulated sugar and some phosphates obtained by calcining brewers' yeast; then I sow in the liquid some spores of *penicillium* or some other mucedin.[1] These spores germinate easily, and soon, in only two or three days, the liquid is filled with flocs of mycelia, of which a large number are not slow to spread out on the surface of the liquid where they reproduce. The growth is far from feeble. By the precaution of using an acid salt of ammonia, one may prevent the development of the infusoria, which, by their presence, soon arrest the progress of the little plants, by absorbing the oxygen of the air, which the mucedins are not able to take from them. All the carbon of the plant is borrowed from the sugar which disappears completely little by little, its nitrogen from the ammonia, its mineral matter from the phosphates. There is therefore in this point of the assimilation of nitrogen and the phosphates a complete analogy between the ferments, the mucedins and the plants of complicated organization. This the following work will succeed in proving in a definite manner.

Three Elements Necessary

If, in the experiment which I have just recounted, I omit one or another of the substances in solution, the growth is arrested. For example, the mineral matter is that which seems the least indispensable for beings of this nature. Indeed, if the liquor is deprived of phosphates, no more growth is possible, whatever may be the proportion of sugar and ammoniacal salts. Scarcely would the germination of the spores begin on account of the importance of the phosphates unless the spores themselves, which have been sown, introduced an infinitely small quantity. Similarly if one omits the salt of ammonia, the plant is able to experiece no development. It makes only a puny beginning of growth on account of the presence of albuminous material of the spores sown, even though there is no abundance of free nitrogen in the air about or in solution in the liquid. Finally, it is still the same if one omits the sugar, the carbon food, even though there may be in the air or in the liquid any proportion of carbonic acid. All shows indeed that, in respect to the source of carbon, the mucedins differ essentially from the phanerogamous plants. They do not decompose carbonic acid; they do not liberate oxygen. The absorption of oxygen and the liberation of carbonic acid are on the contrary necessary and permanent activities of their life.

These facts give us precise ideas of the method of nutrition of the mucedins, with regard to which science has never before possessed connected observations.

Louis Pasteur was born December 27, 1822, at Dôle in Franche-Comté, and died in a suburb of Paris, September 28, 1895. At the age of 26 he was appointed Professor of Physics at Dijon, then in the same year he became Professor of Chemistry at Strasburg. At that time he was greatly interested in the problems of stereo-isomerism in organic compounds, and particularly in the fact that, while both right-hand and left-hand crystals are formed in equal quantities in the laboratory, the natural products, for instance tartrates from grapes, may contain one sort without the other. He found, too, that certain minute organisms are able to use up, from a mixture of the two sorts of crystals, only one, as the right-hand variety, leaving the left-hand salt unchanged in the solution. This work led Pasteur directly to studies of minute organisms such as yeasts and ferments, then widely believed to form spontaneously from decomposing organic material. Pasteur was able to discover and make clear the whole field of microscopic life. He founded the science of bacteriology and invented its technique.

Science News-Letter, January 14, 1928

The Babylonians told time by sundials as far back as 2000 B. C.

The largest black diamond ever found was about the size of a baseball.

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[1] This is the composition of some of the liquors which I have used:

20 gr. granulated sugar
2 gr. bitartrate of ammonia
0 gr. 5 ashes of brewers' yeast
1 liter of pure water
20 gr. granulated sugar
1 gr. tartaric acid
1 gr. potassium nitrate
0 gr. 5 ashes of yeast
1. liter of pure water

It is on the surface of these liquors or other similar ones that I sow the spores of the mucedins.

It is possible to replace the salt of ammonia by a salt of ethylamine. But I have not had growth of the little plants by substituting arsenates for phosphates. I have exhibited before the Academy, at its session of November 12, 1860, various examples of these results.

First Glances at New Books

STARDUST—Sonnets by William Adams Slade—*Preston and Rounds.* A sequence of ten sonnets by one who combines a love of astronomy, religion and literature. Here is the beginning of one:

"Far beacons on up-clustered shores in space,
The Cepheids speed their signal-beams below,
The while men watch, those pulsing ways to trace,
And chart the heights and headlands that they show."

Science News-Letter, January 14, 1928

THE STORY OF CHEMISTRY—Floyd L. Darrow—*Bobbs-Merrill* ($4). Mr. Darrow uses an historical approach and devotes a chapter to the alchemist and a longer one to the rapid development of scientific chemistry from Lavoisier to Ostwald. But by far the greater part of the book is concerned with the present rather than the past, and the future rather than the present. At least half the material presented would be wholly new to anyone who stopped reading chemistry twenty years ago. He would find Einstein's equation, Millikan's cosmic ray, Bohr's atom, glandular chemistry, and the like in the field of theory, and even more extensive discussions of practical applications of recent discovery; oil substitutes, synthetic dyes and drugs, artificial rubber, rayon and radio. The treatment of these topics is competent and free from sensationalism, and the illustrations, bibliography and index are useful auxiliaries to the text.

Science News-Letter, January 14, 1928

ESSAYS, ENGLISH AND AMERICAN—Raymond MacDonald Alden, revised by Robert M. Smith—*Scott, Foresman* ($1). Selections from thirty-seven authors from Bacon and Addison to the present. A light compact volume in flexible binding convenient for the satchel or overcoat pocket. The first edition edited by the late Professor Alden ended with Thoreau but Professor Smith as editor of the new edition has added essays by Andrew Lang, G. Lowes Dickinson, John Galsworthy, Sir Philip Gibbs, Hilaire Belloc, John Eglinton, George Santayana, Christopher Morley, Edwin E. Slosson, Robert C. Benchley, William Beebe, Stephen Leacock.

Science News-Letter, January 14, 1928

PRIESTS AND KINGS—Harold Peake and Herbert John Fleure—*Yale* ($2). The fourth volume to appear in a splendid new series by the Yale University Press on "The Corridors of Time." "When cultivation leads to permanent settlement and this, again, to intercourse and trade, villages may grow into cities and written records may be kept; kings and priests then become prominent features of civilization. The present volume sketches this phase of evolution," say the authors, and in doing so they tell of the Sumerian and Egyptian civilizations.

Science News-Letter, January 14, 1928

CHEMICAL PATENTS INDEX—Edward Chauncey Worden—*Chemical Catalog* ($25). The first of five volumes that will cover the subject matter of specification and claims of United States patents during the period from 1915 to 1924 in the entire field of chemical technology. This volume contains the complete index of names and the index of subjects from A to B.

Science News-Letter, January 14, 1928

ANNUAL SURVEY OF AMERICAN CHEMISTRY — National Research Council — *Chemical Catalog* ($3). The second of a useful series containing accounts of chemical progress during the past year. This covers the period from July 1, 1926, to July 1, 1927, with articles by 51 leading chemists on their respective fields.

Science News-Letter, January 14, 1928

ANNUAL REPORTS FOR 1926—*The Chemical Society (London).* A British publication describing the progress of chemistry in its various fields during 1926.

Science News-Letter, January 14, 1928

EMILE BERLINER—Frederic William Wile—*Bobbs-Merrill* ($4). The fascinating story of a German immigrant boy who became the inventor of the form of phonograph now in world use, the microphone that is the visible symbol of radio, an "acoustic tile" to prevent echoes, and other useful devices. Contains a preface by Secretary Hoover.

Science News-Letter, January 14, 1928

EVERY MAN A BRICK!—Merritt M. Chambers—*Public School Publishing Co.* A brief survey of the status of military training in American Universities.

Science News-Letter, January 14, 1928

BIOLOGY

NATURE RAMBLINGS

By FRANK THONE

528

Ancestral Insect

Fossil insects aplenty have been found along with the mighty bones of mammoths and dinosaurs. In fact, insects are older than either, though they are by no means the oldest of animals. They are, however, pretty well back among the First Families of Land Animals, for there were insects on earth during the days when coal was being formed in vast bogs—dragon-flies with a twelve-inch wing spread, cockroaches three or four inches long.

Most interesting to naturalists among these fossil fliers, however, is one form resembling nothing that is left on earth, and regarded as the original ancestor of all insects, or at least as something very near such an ancestor. Its general body structures are more primitive than those of the most primitive living insect, but the most astonishing thing about it is that it has three pairs of wings!

Two pairs, corresponding to the orthodox two pairs of wings carried by typical modern insects, were the thin, membranous affairs we expect insects to have, but the third pair, carried on the first segment of the thorax or chest region, were apparently of no use in flying. They seem to have consisted of thick, stiff, horny stump-like affairs, possibly more or less like the thick protective wing-covers of beetles, but projecting permanently sidewise. They may have had a little effect as rigid "gliders" when the insect was in flight, but it is hard to see of what other use they were. But as representatives of wings in the making, or possibly as degenerate relics of wings that once were, they are intensely interesting.

Science News-Letter, January 14, 1928

There are almost 600 kinds of parrots.

Bedouins of the desert distinguish between footprints made by different tribes.

THE WORLD MOVES SWIFTLY

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